Iden.2205   **Design of Structures (1+1)**   **Marks: 50**
Time: 2 hours

I   **Fill in the blanks**   **(10x1=10)**
1. The ratio of shearing stress to shearing strain within elastic limit, is known as _____.
2. A beam is defined as a structural member subjected to _____.
3. The method of design of steel framework for greatest rigidity and economy in weight, is known as_____.
4. The effective length of a weld, is taken as the actual length - _____.
5. Stiffeners are used in a plate grider to _____.
6. The effective length of a fillet weld should not be less than _____ times the weld size.
7. In moment resistant connections, the moment resistance of riveted connection depends upon _____.
8. The most economical section for a column is _____.
   Answer the following
9. Define slenderness ratio of a compression member.
10. Find the value of permissible stress in axial tension (σ_{at}) for $f_y = 250$ MPa.

II   **Write short notes on ANY FIVE of the following**   **(5x2=10)**
1. What is semi-rigid connections?
2. State why unequal angles with long legs connected are more efficient.
3. How beam sections are classified for bending as per IS: 800- 2007? Describe any two of them.
4. What is shape factor and load factor?
5. Explain local and lateral buckling of beam.
6. Discuss the advantages of fillet weld over butt weld.
7. Steps in design of a tension member.

III   **Answer ANY FIVE of the following**   **(5x4=20)**
1. Classify connections as per IS800 as per ultimate strength.
2. Describe stress strain curve for the Mild Steel with neat sketch.
3. Describe the various types of loads and Load Combinations as per IS code.
4. Explain what do you mean by shear lag?
5. Differentiate between Laterally supported and unsupported beams with a neat sketch.
6. Explain web crippling and web buckling with the help of sketch.
7. Explain limit state of serviceability and limit state of collapse briefly.

IV   **Write an essay on ANY ONE of the following**   **(1x10=10)**
1. Check whether ISMB250 at 37.4 kg/m is suitable or not as a simply supported beam over an effective span of 6 m. The compression flange of beam is laterally supported throughout the span. It carries uniformly distributed load of 15 kN/m (including self weight).
   Properties of ISMB 250 are $b_f = 125$ mm, $t_f = 12.5$ mm, $t_w = 6.9$ mm, $I_{xx} = 5131.6 \times 10^4$ mm^4, $Z_{xx} = 410 \times 10^3$ mm^3, $r1 = 13.0$ mm, $Z_{px} = 465.71 \times 10^3$ mm^3, $y_{m0} = 1.1$, $\beta_b = 1$ and $f_y = 250$ MPa.
2. Design a slab base for column ISHB 400 at 82.2 kg/m to carry factored axial compressive load of 2000 kN. The base rests on concrete pedestal of grade M20. For ISHB 400, $b_f = 250$ mm, $f_y = 250$ MPa, $f_u = 410$ MPa, $y_{mo} = 1.1$, $t_f = 12.7$ mm.

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